NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

F A C T S H E E T
(Pursuant to NAC 445A.236)
August 2004

PERMITTEE NAME: Empire Ranch Golf Course

PERMIT NUMBER: NEV92015

DISCHARGE LOCATION: Empire Ranch Golf Course
1875 Fair Way
Carson City, Nevada 89701

Latitude: 39°10'30" North
Longitude: 119°42'30" West

Township 15 South, Range 20 East, Sections 10 and 11

PUBLIC WATER SUPPLY: Within a Carson City Water Department well protection zone.

FLOW: 1.5 million gallons per day (MGD)

GENERAL:
The Empire Ranch Golf Course uses treated effluent from the Carson City Utility Department Wastewater Reclamation Plant for spray irrigation of 180 acres of turf grass and flood discharge of 30 acres of ponds (water hazards) and wetlands. The first permit authorizing the use of reclaimed wastewater for irrigation of this site was issued to Darling Ranch in 1993.

Irrigation using treated effluent is conducted in accordance with an Effluent Management Plan (EMP) submitted to, and approved by, the Nevada Division of Environmental Protection, Bureau of Water Pollution Control (BWPC). An approved EMP is on file at the BWPC.

DISCHARGE CHARACTERISTICS:
Water used for irrigation is treated to meet secondary standards, nitrified, and chlorine disinfected. Data on file for the 4th quarter 2003 reports effluent characteristics as follows:

PARAMETER	AVERAGE VALUE	MAXIMUM VALUE
Fecal Coliform (CFU/100 mL)	1.2	11.0*
Carbonaceous Biochemical Oxygen Demand (CBOD, mg/L)	8.0	17.7
Total Suspended Solids (TSS, mg/L)	4.6	7.58
Total Nitrogen (mg/L)	17.9	29.6
Nitrate (mg/L)	3.2	19.2
pH (SU)	7.50	7.62
Chlorine (mg/L)	0.3	0.5

* Single event in February 2002. The standard deviation of the value reported is 1.5 CFU/100 mL, which supports compliance with permit limitations.

The golf course is located on the east side of Carson City, south of U.S. Highway 50, and is bounded on the east by the Carson River. Operating procedures specified in the proposed permit and the EMP are required to prevent

discharge to the river under normal conditions. Storage ponds or water features on site containing treated wastewater are required to be managed and operated in accordance with conditions included in the approved EMP to minimize the potential for discharge to the Carson River during storm events. Ponds and water features are required by permit condition to contain, with no discharge, the once-in-one-hundred year, 24-hour storm.

RECEIVING WATER CHARACTERISTICS:

Treated effluent used for irrigation discharges to groundwater, which is encountered at depths ranging from approximately 7 to 23 feet below grade surface. Effluent limitations are based, in part, on primary drinking water standards to protect the potential beneficial use of groundwater resources.

The golf course is immediately east (downgradient) of Carson City Water Department municipal pumping well #40 and within the estimated capture zone of five (5) other wells owned by Carson City Water Department. Records on file indicate that that well #40 is advanced to a total depth of 1260 feet below grade surface (bgs) with mill-slotted casing extending between 473 to 1260 feet bgs. The top 50-feet of the well is completed with a sanitary seal, below which the annular space is filled with gravel pack to depth. The Carson City Water Department will be provided notice of this proposed permit renewal.

Groundwater flow direction is reported to be in an easterly direction toward the Carson River. Groundwater monitoring wells MW-1, 2, and 3 are used to characterize groundwater upgradient and downgradient of the course. MW-3 is located west of the course and MW-1 and MW-2 are located on or near the east property boundary, between the course and the Carson River. The proximity of MW-1 and MW-2 to the Carson River suggests that groundwater elevation and quality at these locations may be distinctly influenced by river water.

The profile of groundwater at each monitoring location is as follows[1]:

Well Location	Approximate Depth to Water (feet below top of casing)	Nitrate Concentration (mg/L, 2002 through 2003)	Total Dissolved Solids (mg/L)	Chlorides (mg/L)
MW-1	7-12	0-0.3	370-1265	75-152
MW-2	7-13	0	330-1297	63-149
MW-3	17-23	0.37-11.2	95-627	6-74

[1] 4th Quarter Annual Report 2003, data reported 1998 through 2003

The current permit contains threshold provisions requiring response actions if nitrate as nitrogen concentrations increase to 7, 9, or 10 milligrams per liter (mg/L) at any of the monitoring well locations. This provision is retained in the proposed permit to provide sustained protection of groundwater resources.

PROPOSED LIMITATIONS:

Proposed limitations are designed to verify the constituent composition of effluent discharges and control application and operational parameters to protect groundwater conditions.

During the period beginning on the effective date of this permit and lasting until the permit expires, the Permittee is authorized to discharge treated wastewater effluent for irrigation of Empire Ranch Golf Course.

Samples and/or measurements taken in compliance with the monitoring requirements specified below shall be collected:

- At a flow meter accessible at the facility and available for routine measurement; and
- After treatment and prior to distribution for reuse. Data may be obtained from the Carson City Utility Department Wastewater Reclamation Plant to satisfy compliance and reporting requirements confirming effluent quality.

The supplier of the effluent may perform required analytical monitoring; however, the Permittee must report the analytical results to verify compliance with effluent reuse limitations in accordance quarterly reporting requirements.

The discharge shall be limited and monitored as specified below:

PARAMETERS	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS	
	30-Day Average	Daily Maximum	Annual Total	Measurement Frequency	Sample Type
Total Flow (mgd)	-----	1.5	-----	Continuous	Flow Meter
Annual Application Volume (acre-feet/year)	-----	-----	1,145[1]	Monthly	Flow Meter or Totalizer
Fecal Coliform[2] (CFU/100 mL)	2.2	23	-----	Weekly	Discrete
Nitrate as N (mg/L)	Monitor & Report			Monthly	Discrete
Total Nitrogen as N (mg/L)	Monitor & Report			Monthly	Discrete
Total Nitrogen as N Applied (pounds)	Monitor & Report			Monthly	Calculation
Cumulative Annual Nitrogen Applied (pounds/year)[3]	-----	-----	36,863[4]	Quarterly	Calculation (cumulative)

mgd: Million gallons per day
CFU/100 mL: Colony forming units per 100 milliliters
mg/L: Milligrams per liter
as N: As nitrogen

Footnotes:

[1]: Determined from the Water Balance (Effluent Management Plan, December 1995, p.12 and Tables F1-F3) and limited to 110% of the estimated irrigation requirement based on plant water use.

[2]: Fecal coliform concentrations must be limited based on required buffer zones specified in NAC 445A.276. For zero-distance buffer zones, fecal coliform concentrations must be equal to or below the effluent reuse limitations prescribed.

[3]: Annual nitrogen load is determined based on the nitrogen budget. The total annual nitrogen applied (lbs/acre/year) shall not be greater than the total annual nitrogen uptake (lbs/acre/year). Calculations and monitoring data shall use the **total nitrogen** in the applied wastewater (monitored by the treatment facility), total nitrogen from fertilizer applications, nitrogen uptake by crops or vegetation, evapotranspiration rate, precipitation rate, and fraction of applied nitrogen removed by denitrification and volatilization.

Quarterly accounting of nitrogen load is required to track and verify timely management of nitrogen application throughout the progression of a calendar year. Each quarter, the cumulative annual amount of total nitrogen applied (January through December) shall be increased by the incremental amount of nitrogen applied during the reported quarter. Data provided in the fourth quarter annual report must demonstrate compliance with the annual nitrogen load allocated (January through December).

[4]: This value is calculated from nitrogen uptake data provided in the approved Effluent Management Plan (December 1995, p. F-3). 36,863 pounds/year on 210 acres (180 acres turf, 30 acres wetland) = 175 pounds per acre per year.

Rationale:

Flow: Flow is limited by the volume of treated effluent requested and available from the Carson City Utility Department Wastewater Reclamation Plant.

Annual Application Volume: This parameter is required under the EMP. The annual application volume assigned is based on the calculated plant water use requirement (1,041 acre feet per year) provided in the EMP (on file,

December 1995, p.12). The permitted value is 110% of the value calculated.

Fecal Coliform: The concentration of fecal coliform in treated wastewater discharged for irrigation is restricted in accordance with NAC 445A.276 for a zero-distance buffer zone.

Nitrate: The nitrate concentration in applied effluent is a monitor and report requirement to track this fraction of the total nitrogen mass applied to the site for purposes of evaluating groundwater conditions. Should nitrate concentrations in groundwater begin to exhibit an increasing trend, further examination of nitrate concentrations in effluent and how application rates affect groundwater may be required.

Total Nitrogen: The concentration of total nitrogen in treated wastewater used for irrigation is required for purposes of determining mass discharge to irrigated landscape areas. The nitrogen concentration in treated wastewater is a component of the calculation for monthly nitrogen mass application, which is ultimately used to reconcile annual nitrogen budgets.

The total nitrogen as nitrogen (as N) application rate and the annual nitrogen load (balance) are required under the EMP. The cumulative (allowable) total nitrogen applied is calculated based on a total irrigation area of 180 acres with a mix turf grasses as defined in Appendix F-3 of the approved EMP (on file, December 1995) and 30 acres of wetlands with a plant uptake rate of 250 pounds per acre per year. Quarterly reconciliation of the nitrogen mass applied is required so that facility operators can assess and optimize irrigation practices to effectively manage and routinely demonstrate projected compliance with the annual nitrogen load (balance) limitation.

GROUNDWATER MONITORING REQUIREMENTS:

Existing monitoring wells shall be sampled for the presence of nitrogen compounds, TDS, and chloride. Monitoring wells shall be measured and sampled according to the following parameters:

PARAMETERS	GROUNDWATER LIMITATIONS	SAMPLE LOCATIONS[1]	MONITORING REQUIREMENTS	
			Measurement Frequency[2]	Sample Type
Depth to Water (feet)	Monitor & Report	Each well	Quarterly	Discrete Measurement
Groundwater Elevation (amsl)	Monitor & Report	Each well	Quarterly	Discrete Measurement
Groundwater Gradient and Flow Direction (ft/ft, compass direction)	Report	-----	Quarterly	Calculate & Illustrate[3]
Total Nitrogen as N (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Nitrate as N (mg/L)	10	Each well	Quarterly	Discrete
Total Dissolved Solids (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Chloride (mg/L)	Monitor & Report	Each well	Quarterly	Discrete

amsl: above mean sea level
ft/ft: foot per foot (vertical to horizontal)
mg/L: milligram per liter
as N: as Nitrogen

Footnotes:

[1]: Monitoring wells currently include: MW-1, 2, and 3. All groundwater monitoring wells installed as a function of the permitted discharge shall be included in the monitoring program prescribed.

[2]: Sampling frequency may be modified or reduced, in whole or in part, at the discretion of the Division, upon demonstration of groundwater concentrations or conditions which warrant or justify alternative monitoring schedules.

[3]: Groundwater gradient and flow direction shall be calculated based on surveyed well locations and casing elevations. Well locations must be clearly labeled on a scaled map illustrating and denoting the groundwater gradient and flow direction.

- Wells shall be monitored in accordance with permit conditions and EMP requirements. Should site conditions and/or operational activities necessitate or warrant the installation of additional monitoring wells, all wells shall be incorporated into the required monitoring schedule. All subsequent monitoring wells proposed or required (designs and locations) shall be approved by the Division prior to installation and constructed in general accordance with "WTS-4: Monitoring Well Design Requirements" (NDEP, February 1997).

- If the nitrate as nitrogen (as N) concentrations measured in groundwater increase to:

    i. 7.0 mg/L, the Permittee shall revise the EMP to provide management practices which increase the nitrogen uptake by vegetation and/or adjust other nitrogen sources such as fertilizer application rates.

    ii. 9.0 mg/L, the Permittee shall execute all corrective action necessary to ensure no further degradation of groundwater. The Permittee shall conduct an engineering evaluation that reviews irrigation programs, lawn maintenance practices, and hydrologic conditions to define and describe the cause or source of additional nitrate load to the shallow aquifer, and shall propose short and long-term solutions to justify the continued use of treated effluent for irrigation purposes.

    iii. 10.0 mg/L, the Permittee shall discontinue the use of reclaimed wastewater and the discharge to groundwater shall cease, unless otherwise authorized by the Division.

SCHEDULE OF COMPLIANCE:

The Permittee shall implement and comply with the provisions of the permit upon issuance and the following schedule of compliance, including in said implementation and compliance, any additions or modifications the Administrator may make in approving the schedule of compliance.

- **Upon issuance of the permit,** the Permittee shall achieve compliance with all discharge limitations; and,

- **Within 45 days of the permit issuance date *(date)*,** a new EMP, stamped by a professional engineer licensed in the State of Nevada, shall be submitted to the Division for approval. **The Permittee shall not use reclaimed water after the 45-day due date without having submitted a redrafted EMP per NAC 445A.275, unless granted otherwise by the Division.**

    - The EMP shall contain the information required to comply with this permit. Preparation of the EMP in accordance with *WTS-1 – Guidance Document for Effluent Management Plans for Reuse of Wastewater Effluent* is recommended.

    - The EMP shall include operation and maintenance procedures for the use and operation of the irrigation systems, including storage ponds.

    - Copies of documentation used for purposes of hazard notification to grounds keepers, contractors, or exposed personnel shall be included in the EMP.

    - The EMP shall include a description of sampling and analysis procedures for monitoring requirements specified as a condition of this permit.

PROPOSED DETERMINATION:

The Division has made the tentative determination to issue (renew) the proposed permit, under the provisions prescribed, for a 5-year period. Under NAC 445A.232, this permit is classified as a *Discharge of Treated Effluent for Irrigation - 1,000,000 gallons or more but less than 10,000,000 gallons daily.*

PROCEDURES FOR PUBLIC COMMENT:

Notice of the Division's intent to issue a permit authorizing the facility to discharge to groundwater of the State of Nevada, subject to the conditions contained within the permit, is being sent to the **Nevada Appeal** for publication. Notice is also mailed to interested persons on our mailing list *and the Carson City Water Department*. Anyone wishing to comment on the proposed permit can do so in writing for a period of 30 days following the date of the public notice, and must be postmarked, faxed, or e-mailed by 5:00 p.m. on **September 13, 2004**. The comment period can be extended at the discretion of the Administrator. A public hearing on the proposed determination can be requested by the Applicant; any affected State; any affected interstate agency; the Regional Administrator; or any interested agency, person, or group of persons. The request must be filed within the comment period, and must indicate the interest of the person filing the request and the reason(s) why a hearing is warranted. Public hearings granted by the Division are conducted in accordance with NAC 445A.238. The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to NRS 445A.605.

Prepared by: Tamara J. Pelham
August 10, 2004
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